

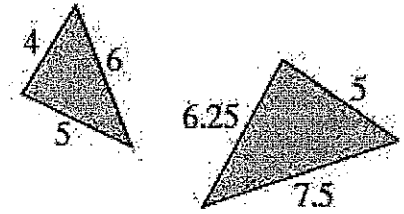


### 10-4 Perimeters and Areas of Similar Figures

Similarity Ratio	Ratio of Perimeters	Ratio of Areas
$\frac{a}{b}$ $a:b$	$\frac{a}{b}$ $a:b$	$\frac{a^2}{b^2}$ $a^2:b^2$

1. The triangles at the right are similar. Find the ratio of their perimeters and of their areas.

$$P = \frac{5}{7.5} \qquad A = \frac{5^2}{7.5^2} = \frac{25}{56.25}$$



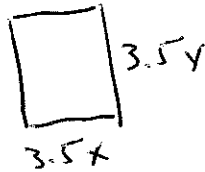
2. The ratio of the length of the corresponding sides of two regular octagons is  $\frac{8}{3}$ . The area of the larger octagon is  $320 \text{ ft}^2$ . Find the area of the smaller octagon.

$$\frac{8^2}{3^2} = \frac{64}{9} \qquad \frac{320}{\left(\frac{64}{9}\right)} = 45$$

$$A = 45 \text{ ft}^2$$

3. Lauren plants the same crop in two rectangular fields. Each dimension of the larger field is  $3\frac{1}{2}$  times the dimension of the smaller field. Seeding the smaller field costs \$8. How much money does seeding the large field cost?

$$8 = xy$$



$$\begin{aligned} 3.5x \cdot 3.5y &= 12.25xy \\ &= 12.25(8) \text{ or } A = 1 : 12.25 \\ &= 98 \end{aligned} \qquad \begin{aligned} 1 : 3.5 \\ 8(12.25) \\ &= 98 \end{aligned}$$

4. Two similar polygons have corresponding sides in ratio 5:7.  
 a. Find the ratio of their perimeters.      B. Find the ratio of their areas.

$$5:7$$

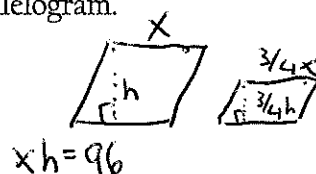
$$\begin{aligned} 5^2 : 7^2 \\ 25 : 49 \end{aligned}$$

5. The corresponding sides of two similar parallelograms are in the ratio  $\frac{3}{4}$ . The area of the larger parallelogram is  $96 \text{ in}^2$ . Find the area of the smaller parallelogram.

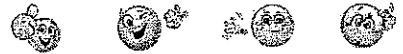
$$\begin{aligned} 3:4 \\ 9:16 \end{aligned}$$

$$\begin{aligned} A &= \frac{9}{16}(96) \\ &= 54 \text{ in}^2 \end{aligned}$$

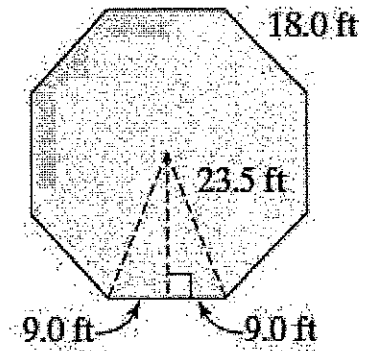
or



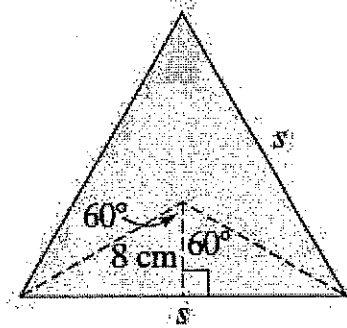
$$\begin{aligned} \frac{3}{4}x \cdot \frac{3}{4}h &= \frac{9}{16}xh \\ &= \frac{9}{16}(96) \\ &= 54 \text{ in}^2 \end{aligned}$$



4. A library is in the shape of a regular octagon. Each side is 18 ft. The radius of the octagon is 23.5 ft. Find the area of the library.

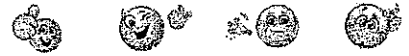


5. Find the area of an equilateral triangle with apothem 8 cm. Leave your answer in simplest radical form.



6. The side of a regular hexagon is 10 ft. Find the area of the hexagon.

Learning Target: I can find the area of a regular polygon using trigonometry  
I can find the area of a triangle using trigonometry



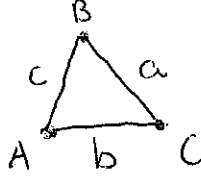
## 10-5 Trigonometry and Area

The area of a triangle is equal to:

$$\Delta ABC = \frac{1}{2}bc(\sin A)$$

Side b and c share angle A.

Visual:



So, now you'll have to decide which formula to use:

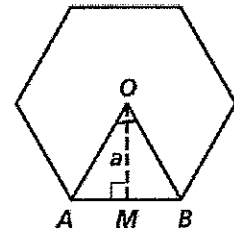
$$A = \frac{1}{2}bc \sin A$$

$n = \text{number of sides.}$

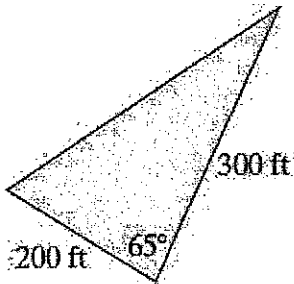
$$A = \frac{1}{2}ap$$

What happens when we don't know the apothem of a regular polygon?

We will need to use the angle measure shared by the two legs that are my radii.



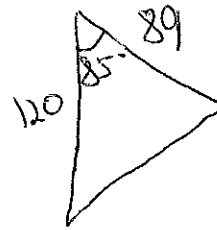
1. A triangular park has two sides that measure 200 ft and 300 ft and form a  $65^\circ$  angle. Find the area of the park.



$$A = \frac{1}{2}(200)(300)\sin(65)$$

$$A = 27189.23 \text{ ft}^2$$

2. Two sides of a triangular building plot are 120 ft and 89 ft long. They include an angle of  $85^\circ$ . Find the area of the building plot to the nearest tenth.



$$A = \frac{1}{2}(89)(120)(\sin 85)$$

$$A = 5319.68 \text{ ft}^2$$



6. The similarity ratio of the dimensions of two similar pieces of window glass is 3:5. The smaller piece costs \$2.50. What should be the cost of the larger piece?

$$3:5 \quad 9:25 \quad \frac{25}{9} * 2.50 = \$6.94$$

7. The areas of two similar pentagons are 32 in<sup>2</sup> and 72 in<sup>2</sup>. What is their similarity ratio? What is the ratio of their perimeters?

$$32:72 \xrightarrow{\div 8} 4:9 \xrightarrow{\sqrt{\quad}} 2:3$$

8. The areas of two similar pentagons are 625 m<sup>2</sup> and 225 m<sup>2</sup>. What is the ratio of their perimeters?

$$625:225 \xrightarrow{\div 25} 25:9 \xrightarrow{\sqrt{\quad}} 5:3$$

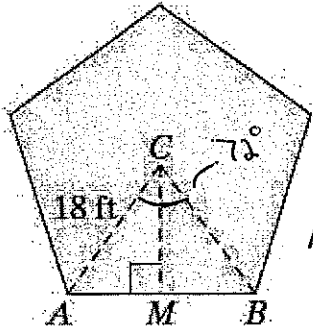
HW: 2-8 even, 9, 10-20 even, 24

I x L 5.10 to 90

**Learning Target:** I can find the area of a regular polygon using trigonometry  
 I can find the area of a triangle using trigonometry



3. The radius of a garden in the shape of a regular pentagon is 18 feet. Find the area of the garden.

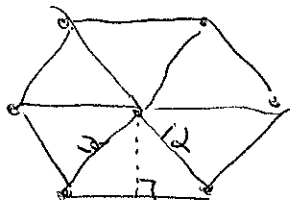


$$\frac{360}{5} = 72^\circ$$

$$A = \frac{1}{2} (18)(18)(\sin 72^\circ)(5)$$

$$A = 770.36 \text{ ft}^2$$

4. Find the area of a regular hexagon with radius 12 ft.



$$\frac{360}{6} = 60$$

$$A = \frac{1}{2} (12)(12)(\sin 60^\circ)(6)$$

$$A = 374.12 \text{ ft}^2$$

5. Find the area of a regular octagon with a perimeter of 80 inches. Give the area to the nearest tenth.



$$\tan 67.5 = \frac{x}{6.75}$$

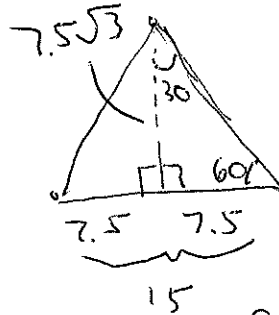
$$12.1 = x$$

$$\text{apothem} = 12.1$$

$$A = \frac{1}{2} (12.1)(80)$$

$$A = \text{~~482.8~~} 482.8 \text{ in}^2$$

6. Find the area of a regular hexagon with perimeter 90 ft.



$$A = \frac{1}{2} (90)(7.5\sqrt{3})$$

$$A = 337.5\sqrt{3}$$

HW: 2, 4, 5, 6, 8, 11-14, 17, 21, 22

